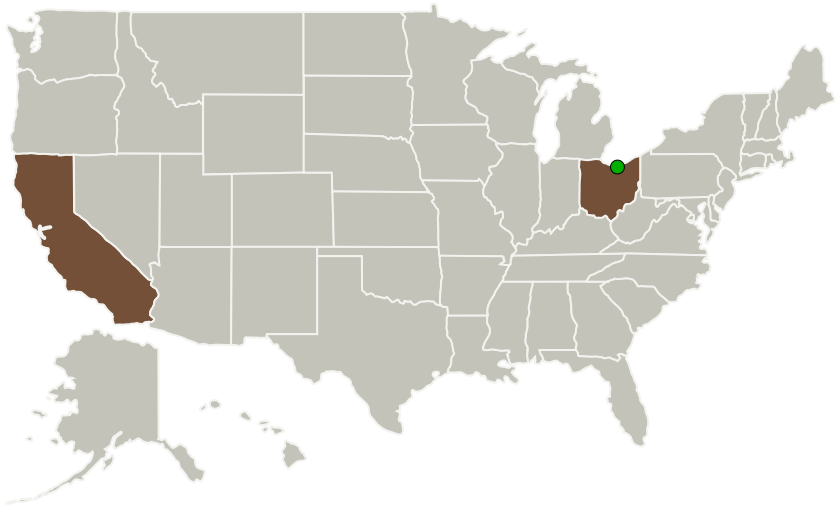
An Airborne Particulate Monitor for Spacecraft, Phase I

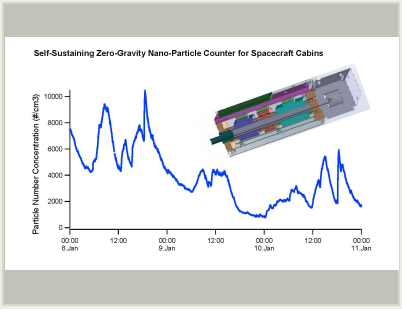
Completed Technology Project (2015 - 2015)

Project Introduction

Currently there are no tools to monitor the size or concentration of nanometer to submicrometer particles aboard spacecraft cabins. Yet there are many sources aboard the spacecraft known to generate particles in this ultrafine size range. Our technology provides a means to make this measurement in a compact, low power, unit that may be made suitable for spacecraft. With a newly developed, self-sustaining water-based condensation particle technology, particles from the nanometer to micrometer size range are enlarged through water condensation and counted optically. Yet, unlike other condensation-based counters, our unit recovers all of the evaporated water within the wick itself. It needs no water reservoirs, and can be operated in any orientation. All water transport is by capillary action, and gravity is not needed. Coupled with a size selection device it can provide data on mean particle size. Measurable concentrations are from 1 to 1 million particles per cubic centimeter. We aim to adapt our existing technology to the long-term, zero-gravity, robust monitoring needed by NASA. Specific objectives are to verify a prototype self-sustaining condensation particle counting system that can be operated in any orientation; that can detect and count individual particles from 10 to 2000 nm; that contains the controls and on-board diagnostics to ensure long-term performance; and whose critical components are compatible with an ultimate package weighing less than 2 kg, and requiring less than 4 watts of power.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Aerosol Dynamics, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Berkeley, California
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
California	Ohio

Project Transitions

June 2015: Project Start

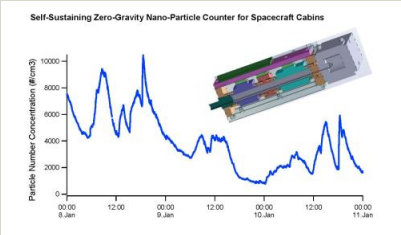
December 2015: Closed out

Closeout Summary: An Airborne Particulate Monitor for Spacecraft, Phase I Pr oject Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/138697)*

Images



Briefing Chart Image
An Airborne Particulate Monitor for Spacecraft, Phase I
(https://techport.nasa.gov/image/131531)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Aerosol Dynamics, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Susanne V Hering

Co-Investigator:
Susanne Hering

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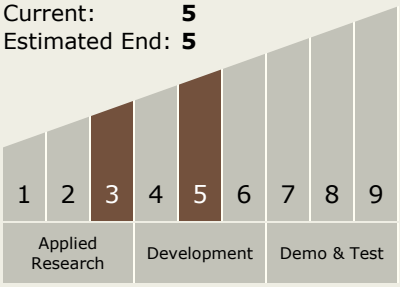
Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.4 Environmental Monitoring, Safety, and Emergency Response
    - TX06.4.1 Sensors: Air, Water, Microbial, and Acoustic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System